



INVESTOR IN PEOPLE

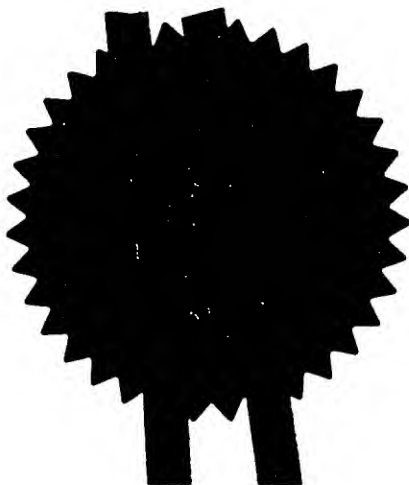
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Concept House  
Cardiff Road  
Newport  
South Wales  
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

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Signed

Dated

14 FEB 2001

The Patent Office

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# Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form).

## 1. Your Reference

P.6156GBA

## 2. Patent application number

(The Patent Office will fill in this part)

06 FEB 1999

9902581.9

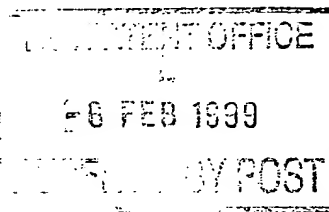
## 3. Full name, address and postcode of the or of each applicant (underline all surnames)

NEW TRANSDUCERS LIMITED  
Stonehill  
Huntingdon  
Cambridgeshire  
PE18 6ED  
G.B.

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

7133119003  
G.B.



## 4. Title of the invention

TELEPHONE APPARATUS

## 5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

MAGUIRE BOSS  
5 Crown Street  
St. Ives  
Cambridgeshire  
PE17 4EB

Patents ADP number (if you know it)

00009191002

## 6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day/month/year)

## 7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day/month/year)

## 8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body:)
- See note (d)

**Patents Form 1/77**


9. Enter the number of sheets for any of the following items you are filing with this form.  
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Continuation sheets of this form

Description 5

Claims(s)

Abstract

Drawing(s) 1 + 1 

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

Any other documents  
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date 05/02/99

  
**MAGUIRE BOSS**

12. Name and daytime telephone number of person to contact in the United Kingdom

**P.A. MAGUIRE**

Tel: 01480 301588

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5

TITLE: TELEPHONE APPARATUS

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DESCRIPTION

15       The invention relates to telephone apparatus and more particularly to hand-held and the like telephone receivers, e.g. mobile telephones having a display screen and at least one loudspeaker.

It is known from WO97/09854 to suggest driving the  
20 display screen of a laptop computer as a resonant panel loudspeaker, e.g. of the kind described in WO97/09842.

It is also known to suggest driving the transparent face of a wristwatch to act as a buzzer or sounder i.e. to emit simple sound tones, e.g. to act as an alarm for the  
25 wearer of the wristwatch.

It is among the objects of the invention to provide a telephone having a display screen comprising a transparent panel-form member which can be driven as a loudspeaker,

e.g. to reproduce speech.

According to the invention a telephone receiver or the like comprises a display screen, a resonant panel-form member, at least a portion of which is transparent and through which the display screen is visible and means 5 exciting the panel-form member to resonate to act as an acoustic radiator, the exciter being disposed at an edge or margin of the panel-form member so as not to intrude into the said transparent portion. The telephone receiver 10 may be a so-called mobile 'phone.

The member may be rigid and may be of plastics, e.g. polystyrene, or may be of glass or other transparent material.

More than one vibration exciter may be provided. The 15 vibration exciters may be mounted in pairs to an edge or marginal portion of the panel-form member or other portion of the member outside its transparent portion. The drive means may be coupled directly to the panel-form member.

The exciter(s) may be electrodynamic and may be 20 inertial. Alternatively the exciter(s) may be piezo-electric. The exciter(s) may be resiliently mounted on a frame member, e.g. the casing of the telephone receiver. The panel-form member may be resiliently mounted on the frame along one or more edges. Thus the resilient 25 mounting may extend along three adjacent edges and the exciter(s) may be provided on the fourth edge.

The loudspeaker may be of the general kind described in International patent application number WO 97/09842.

Thus the loudspeaker may comprise a member capable of sustaining and propagating input vibrational energy by bending waves in at least one operative area extending transversely of thickness to have resonant mode vibration components distributed over said at least one area and having a vibration exciter mounted on said member to vibrate the member to cause it to resonate forming an acoustic radiator which provides an acoustic output when resonating.

10 One or more marginal portions of the panel-form member may be clamped or restrained. The whole periphery of the panel-form member may be mechanically clamped. The panel-form member may be mounted in means enclosing a face of the panel-form member whereby acoustic radiation from 15 the said face is contained within the enclosure, in the manner of an infinite baffle loudspeaker. The casing of the telephone receiver may form the baffle.

The panel-form member may form the face of a visual display unit or the like, e.g. the outer transparent 20 protective surface of or over the visual display screen, e.g. liquid crystal display or plasma display, of the telephone. A polymer-film liquid crystal display may be bonded or otherwise mounted on the transparent panel-form member, whereby the loudspeaker and visual display 25 functions are integrated.

The invention is diagrammatically illustrated, by way of example, in the accompanying drawings, in which:-

Figure 1 is a perspective view of a mobile telephone

having a keypad and a display screen,

Figure 2 is a scrap cross-sectional view through the mobile 'phone of Figure 1.

In the drawings a mobile telephone comprises a casing  
5 containing a radio transmitter and receiver, an aerial projecting from the casing for sending and receiving radio signals, a display screen mounted in the casing and a keypad in the casing adjacent to the display screen and through which the device is operated.

10 As shown in Figure 2 the casing is formed with an aperture define by a surrounding peripheral lip below which is mounted a liquid crystal display (LCD) screen visible through a transparent protective cover in the form of a resonant panel-form member which covers the aperture  
15 and which is fixed, e.g. by adhesive means, in the casing along two or more, e.g. three edges by means of an interposed resilient suspension e.g. of foamed rubber strip. An inertial moving coil vibration exciter is mounted on the top edge of the transparent panel-form  
20 cover member to drive the panel to resonate to act as a loudspeaker. The exciter is mounted on a resilient suspension, e.g. of foamed rubber, fixed to the casing. The exciter is hidden behind the peripheral lip of the aperture in the casing and thus is invisible in use. The  
25 transparent panel-form member may be of polystyrene.

It is intended that the loudspeaker may be used normally, i.e. with the loudspeaker placed adjacent the user's ear for privacy, or with the volume raised as a

'hands free' telephone.

A mechanical buzzer, i.e. a no-sound alert, may be incorporated in the loudspeaker.

The invention thus provides a telephone or the like  
5 device in which a protective transparent cover over the display, or perhaps the display itself, is driven to act as a loudspeaker.



Fig 1

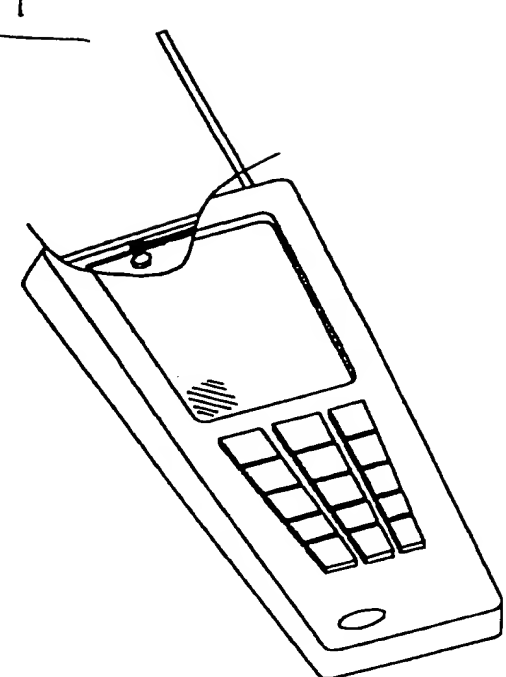


Fig 2

